

METALCASTING

Project Fact Sheet



INCREASING PRODUCTIVITY AND REDUCING EMISSIONS THROUGH ENHANCED CONTROL OF DIE CASTING LUBRICANTS

BENEFITS

For one die casting cell:

- Energy savings of 4,000 kWh per year
- Savings of 3,000 cubic feet of natural gas per year
- Savings of .24 tons of greenhouse gas emissions per year
- Savings of .48 tons of waste liquid per year

For the entire domestic die casting industry (6,000 die casting units):

- Energy savings of 24.6 trillion Btu and 24 million kWh per year
- Savings of 18 million cubic feet of natural gas per year
- Savings of approximately 884,513 tons of greenhouse gas emissions per year
- Potential to save 2,880 tons of waste liquid per year

APPLICATIONS

This technology is applicable to all die casting operations.

A UNIQUE TWO-STEP PROCESS IMPROVES THE EFFICIENCY AND PRODUCTIVITY OF DIE CASTING OPERATIONS

The North American Die Casting Association (NADCA), through a grant from the Department of Energy's NICE³ program, is demonstrating a new method for applying lubricants during the die casting process at Spartan Light Metal Products in Sparta, Illinois. The method uses water, instead of lubricant, to cool heated die surfaces to the preferred lubricant application temperature so dies will not bind with molten alloys.

While lubricant is used primarily to keep molten alloys from binding with die cavities, it cannot effectively coat the die cavity surface until the die is sufficiently cooled. Lubricant, which contains colloidal graphite, chemical additives, and solvents, has traditionally served as the cooling agent. The conventional procedure is costly and brings together the high temperature of the die equipment and copious amounts of lubricant, causing "flash boiling" of the lubricant. This flash boiling results in harmful air emissions and a toxic waste stream. In addition, the quality of workmanship suffers because lubrication levels are often erratic, leading to defective castings that become scrap metal.

Using water as the coolant greatly reduces the source of pollution and enables better regulated levels of lubricant. The new system also captures any remaining run-off and reuses the lubricant, further reducing emissions and improving product quality.

DIE CASTING EQUIPMENT WITH NEW LUBRICATION EQUIPMENT



The NADCA NICE³ project has developed a cleaner energy-saving method for applying lubricants during the die casting process.



Project Description

Goal: Demonstrate at a commercial die casting facility the cost savings, higher productivity, and improved product quality that result from more efficient use of the lubricant needed for die casting dies. The project will also illustrate the effective control of emissions and effluent from the new process.

Initially, measurements will be taken during traditional operations to determine the amount of coolant and energy used without a capture mechanism, and the amount and direction of emissions to determine how they may best be captured. The system will use standard capture equipment and will assess the degree of effectiveness.

The improved die application system will then be installed with sensors to measure the temperature of die casting equipment. The sensors will determine when the application of lubricant is suitable after water has adequately cooled the equipment. Equipment to capture emissions and reuse lubricant will also be installed. Finally, the system will be assessed for differences in energy and waste savings and then demonstrated to potential users.

The North American Die Casting Association is demonstrating this new technology with assistance from the Illinois Department of Commerce and Community Affairs and the NICE³ Program in the Department of Energy's Office of Industrial Technologies.

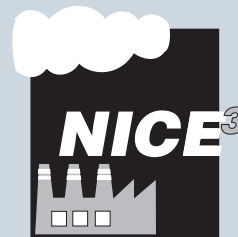
Progress and Milestones

- Measure emissions and quality of the existing system.
- Define and construct the capture and application system.
- Install and conduct tests with the new system.
- Evaluate results and conduct a second round of tests.
- Demonstrate the successful technology and implement its transfer to other producers.

INDUSTRY OF THE FUTURE—METALCASTING

The metalcasting industry – represented by the American Foundrymen's Society (AFS), North American Die Casting Association (NADCA), and the Steel Founders' Society of America (SFSA), has prepared a document, "Beyond 2000," to define the industry's vision for the year 2020. OIT's Metalcasting Vision Team partners with metalcasters, national laboratories, universities, and trade/environmental/technical organizations to develop and implement energy efficiency technologies that benefit both the industry and the United States. Recently, the Metalcasting Team facilitated the development of the Metalcasting Technology Roadmap, which outlines industry's near-, mid-, and long-term R&D goals.

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NICE³—National Industrial Competitiveness through Energy, Environment, and Economics: An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partners for the first commercial demonstration of energy efficient and clean production manufacturing and industrial technologies.

PROJECT PARTNERS

Illinois Department of Commerce and Community Affairs
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North American Die Casting Association
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